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COOK, ALEX, MCFARRON, MANZO,
CUMMINGS & MEHLER, LTD.
Suite 2850
200 West Adams St.
Chicago, IL 60606

EXAMINER	
PHAM, THANH V	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RITSUKO NAGAO, SATOSHI MURAKAMI, and
MISAKO NAKAZAWA

Appeal 2009-003493
Application 09/768,133[1]
Technology Center 2800

Decided[2]: June 30, 2009

Before ROBERT E. NAPPI, SCOTT R. BOALICK, and
KARL EASTHOM, *Administrative Patent Judges*.

BOALICK, *Administrative Patent Judge*.

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[1] Application filed Jan. 23, 2001. The real party in interest is Semiconductor Energy Laboratory Co., Ltd.

[2] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205, all the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

Appellants' invention relates to a method of fabricating a display device which improves the reliability of wirings, facilitates the orientation control of the liquid crystal, or improves a reflectance of a reflective liquid crystal display device. (Spec. 1:3-4, Abstract.) These improvements are said to be achieved by reducing unevenness of a display surface by applying a first leveling film having a thickness smaller than a second leveling film. (Spec. Abstract.)

Claim 1 is exemplary:

1. A method of fabricating a display device comprising the steps of:

forming a semiconductor film over a substrate;

forming an interlayer insulating film over the semiconductor film;

forming a wiring connecting to the semiconductor film through a first hole in the interlayer insulating film on the interlayer insulating film;

forming a silicon nitride film directly formed on the wiring;

forming a first leveling film on the silicon nitride film;

forming a second leveling film structure on said first leveling film, wherein said second leveling film is thicker than said first leveling film; and

forming a pixel electrode over the second leveling film connecting to the wiring through a second hole formed in the silicon nitride film and the first and second leveling films.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Chen	US 5,453,406	Sept. 26, 1995
Tang	US 5,550,066	Aug. 27, 1996
Hanihara	US 5,990,988	Nov. 23, 1999

Applicants' "admitted prior art," at pages 1-2 and 7 and Figures 2 and 3 of the present Application.

Claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205 stand rejected under 35 U.S.C. § 103(a) as being obvious over the combination of Applicants' "admitted prior art," Chen, Tang and Hanihara.

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs and the Answer for their respective details. Except as noted in this decision, Appellants have not presented any substantive arguments directed separately to the patentability of the dependent claims.

In the absence of a separate argument with respect to those claims, they stand or fall with the representative independent claim. *See* 37 C.F.R. § 41.37(c)(1)(vii). Only those arguments actually made by Appellants have been considered in this decision. Arguments that Appellants did not make in the Briefs have not been considered and are deemed to be waived. *See id.*

ISSUE

Appellants argue that the combination of references "do not teach or suggest all the claim limitations, there is no reason why a person of ordinary skill in the art would have changed the process as reflected in the claims, the Examiner has improperly relied upon hindsight reconstruction to reject the claims, and the Examiner's obviousness case has clearly been rebutted." (App. Br. 21.) In particular, with respect to independent claims 1-10, 31, 33, 149, 161 and 173, Appellants argue that Chen does not teach or suggest the limitation "wherein said second leveling film is thicker than said first leveling film" (App. Br. 21-27, 30). Appellants also argue that no reasoning has been provided for the Examiner's proposed modification of Chen (App. Br. 27-28) and that the rejection is based on improper hindsight (App. Br. 28-29, 31). Appellants also point to alleged evidence of "unexpected results" in the Specification (App. Br. 18-19, 21, 29).

Appellants' arguments present the following issue:

Have Appellants shown that the Examiner erred in rejecting claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121,

123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205 under 35 U.S.C. § 103(a)?

The resolution of this issue turns on the following subsidiary issues:

1. Have Appellants shown that the Examiner erred in finding that the combination of Applicants' "admitted prior art," Chen, Tang and Hanihara teaches or suggests the limitation "wherein said second leveling film is thicker than said first leveling film," as recited in independent claims 1-10, 31, 33, 149, 161 and 173?

2. Have Appellants shown that the Examiner erred by improperly combining the applied references?

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

Chen

1. Chen relates to "the formation of planarized insulating layers on semiconductor substrates having irregular surface features." (Col. 1, ll. 9-11.) Chen describes that "the improved planar dielectric layer is very important" (col. 3, l. 28) and that a spin-on-glass process provides for "an improved planarized dielectric layer over substrates having irregular surface topography with micrometer and

submicrometer feature sizes" (col. 2, ll. 50-52). Chen further describes that non-planar surfaces can result in "unwanted distorted photoresist images" during optical exposure of the photoresist (col. 1, ll. 38-39) or "residue on the sidewalls of the underlying patterns which can lead to intra-level shorts" after anisotropic etching to pattern the various conducting layers (col. 1, ll. 39-43).

2. Chen describes that a patterned structure on a wafer surface can have recesses or cavities with various aspect ratios (col. 2, ll. 30-32) (i.e., ratio of the height to the width of a recess or gap (col. 2, ll. 36-38)). Because recesses or gaps with various aspect ratios do not fill similarly during the application of a spin-on-glass liquid precursor using conventional high spin speeds, the planarizing process is more difficult. (Col. 2, ll. 38-42). Chen further describes that, at low spin speeds (e.g., 600 to 800 revolutions per minute (col. 4, ll. 53-58)), both low and high aspect ratio recesses fill more evenly (col. 4, ll. 60-65; figs. 3A and 3B).

3. Chen describes forming an insulating layer 32 over a substrate 10. (Col. 5, ll. 24-25; fig. 5.) A patterned conducting layer 34 is formed over the insulating layer 32 (col. 5, ll. 30-31; fig. 5); and an insulating barrier layer 36 is formed over the conducting layer 34 (col. 5, ll. 49-53; fig. 5).

4. The preferred thickness of the patterned conducting layer 34 is between about 6000 and 9000 Angstroms. (Col. 5, ll. 41-43.) The

spacing between patterned conducting regions can vary from over a micrometer to less than 0.5 micrometer. (Col. 5, ll. 45-46.)

5. Chen describes a first spin-on-glass layer 40 formed over the insulating layer 36. (Col. 5, ll. 62-63; fig. 6.) The first spin-on-glass layer 40 is applied at a substrate rotational speed of 600 to 800 revolutions per minute. (Col. 6, ll. 13-15.) In the claim 4 embodiment, the thickness of the first spin-on layer (i.e., layer 40) is "about 2000 to 4000 Angstroms." (Col. 7, ll. 57-60.) Claim 4 does not recite a thickness for the second spin-on-glass layer (i.e., layer 42).

6. Chen describes a second spin-on-glass layer 42 formed over the first spin-on-glass layer 40. (Col. 6, ll. 25-26; fig. 7.) The second spin-on-glass layer 42 is applied at a substrate rotational speed of 2,500 to 3,000 revolutions per minute. (Col. 6, ll. 35-37.) "The preferred thickness of layer 42 is between about 4000 to 6000 Angstroms." (Col. 6, ll. 53-54.) In the claim 6 embodiment, the thickness of the second spin-on-glass layer (i.e., layer 42) is "about 2000 to 2500 Angstroms." (Col. 7, l. 66 to col. 8, l. 2.) Claim 6 does not recite a thickness for the first spin-on-glass layer (i.e., layer 40).

7. Chen describes that the first spin-on-glass layer 40 is composed of "a silicon-oxide (Si-O) network polymer dissolved in a common organic solvent" (col. 5, ll. 62-66) or a siloxane base material under the trade

name ACCUGLASS (col. 6, ll. 1-3). The second spin-on-glass layer 42 is composed of a similar material. (Col. 6, ll. 28-31.)

Tang

8. Tang relates to a "thin-film-transistor electroluminescent [TFT-EL] device that employs organic material as the electroluminescent media." (Col. 1, ll. 18-21.) Tang describes a TFT-EL device (col. 6, ll. 36-48; fig. 2) including forming an EL cathode 84 over a surface of the device (col. 9, ll. 58-59).

Hanihara

9. Hanihara "relates to a reflection type liquid crystal display (LCD) device." (Col. 1, ll. 6-7.) For an LCD panel (col. 5, ll. 42-47), Hanihara describes forming wiring layers 31, 32 and 33 on a substrate 1 (col. 6, ll. 20-21; fig. 1). The wiring layers can be composed of "metals [such] as aluminum, tungsten, aluminum alloy and layers of titanium and aluminum formed by sputtering, or evaporation or photolithography." (Col. 6, ll. 21-24.)

Specification

10. Appellants' Figure 3 (labeled "Prior Art") illustrates a cross-sectional view of a conventional active matrix. Referring to Figure 3, Appellants describe that "the pixel electrode 111 might be broken because of insufficient flatness of the levelling film" and "since the unevenness due to the level differences remains on the surface of the

pixel electrode 111, poor orientation of the liquid crystal 123 is caused on the uneven region of the surface." (Spec. 2:19-23.)

11. Appellants describe experimental results in which "high flatness can be realized by laminating two or more layers of the material having a high levelling effect (levelling rate)." (Spec. 4:7-8.) Appellants describe experimental results for spin coating over a specific topography which includes "a wiring 401 of a linear protruding pattern having a thickness (initial level difference H_0) in the range of 0.16 to 0.75 μm and a width (designated by L) in the range of 5 to 100 μm . . . formed at constant intervals (designated by P) in the range of 10 to 400 μm on a glass substrate 400." (Spec. 4:16-19; fig. 4.)

12. Appellants' Figure 6 illustrates experimental results for $H_0 = 0.55$ μm; P = 45 μm, 75 μm and 175 μm; L = 25 μm; and $T_1 + T_2 = 1.5$ μm. The thickness of the first leveling film 402 is designated by T_1; and the thickness of the second leveling film 403 is designated by T_2. (Spec. 6:9-11; fig. 4.) Likewise, in one embodiment, "the first levelling film 719 has a thickness of 0.5 μm and the second levelling film 720 has a thickness of 1.0 μm, the total thickness of the films as the second interlayer insulating film is 1.5 μm." (Spec. 17:2-4.)

13. Figure 6 illustrates that "the levelling rate tends to be improved with a larger value of T_2/T_1." (Spec. 6:8-9.) Appellants further describe that the tendency in Figure 6 is established when "a value of $T_1 + T_2$ is constant, $T_1 + T_2$ is from 0.2 μm to 3.0 μm inclusive, with T_1 being

> 0.1 μm or more and less than 1.5 μm and T_2 being 0.1 μm or more and 2.9 μm or less." (Spec. 7:1-4.)

PRINCIPLES OF LAW

On appeal, all timely filed evidence and properly presented arguments are considered by the Board. *See In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984).

In the examination of a patent application, the Examiner bears the initial burden of showing a prima facie case of unpatentability. *Id.* at 1472. When that burden is met, the burden then shifts to the Applicant to rebut. *Id.*; *see also In re Harris*, 409 F.3d 1339, 1343-44 (Fed. Cir. 2005) (finding rebuttal evidence unpersuasive). If the Applicant produces rebuttal evidence of adequate weight, the prima facie case of unpatentability is dissipated. *See Piasecki*, 745 F.2d at 1472. Thereafter, patentability is determined in view of the entire record. *Id.* However, on appeal to the Board it is the Appellants' burden to establish that the Examiner did not sustain the necessary burden and to show that the Examiner erred. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [for obviousness] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

The burden rests with Appellants to show that the invention provides unexpected results, that the results have an unexpected difference from those obtained in the prior art, and that the results are obtained through the invention. *See In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). Evidence

presented to rebut a prima facie case of obviousness must be commensurate in scope with the claims to which it pertains. *In re Dill*, 604 F.2d 1356, 1361 (CCPA 1979). Moreover, "[e]stablishing that one (or a small number of) species gives unexpected results is inadequate proof." *In re Greenfield*, 571 F.2d 1185, 1189 (CCPA 1978) (citation omitted); *see also In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) (holding that a single example did not provide an "adequate basis for reasonably concluding that the great number and variety of compositions included by the claims would behave in the same manner as the [single] tested composition.") (citation omitted).

ANALYSIS

We do not find Appellants' arguments that the Examiner erred in rejecting claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205, as being obvious over the combination of Applicants' "admitted prior art," Chen, Tang and Hanihara under 35 U.S.C. § 103(a) to be meritorious.

Claim Limitation: "wherein said second leveling film is thicker than said first leveling film"

Each pending independent claim, namely claims 1-10, 31, 33, 149, 161 and 173, recites the limitation "wherein said second leveling film is thicker than said first leveling film." Appellants argue independent claims 1-10, 31, 33, 149, 161 and 173 together as a group. (App. Br. 21-27.)

Therefore, we select claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellants' arguments (App. Br. 21-27, 30) contending that the combination of Applicants' "admitted prior art," Chen, Tang and Hanihara does not teach or suggest the limitation "wherein said second leveling film is thicker than said first leveling film" are unpersuasive. In particular, Appellants present arguments and evidence[3] in an attempt to show that the second spin-on-glass 42 is thinner than the first spin-on-glass layer 40 of Chen because the second spin-on-glass layer 42 is dispensed at a higher spin speed. (App. Br. 21-27, 30.) Appellants also argue that no reasoning has been provided for the Examiner's proposed modification of Chen (App. Br. 27-28) and that the rejection is based on improper hindsight (App. Br. 28-29, 31). Last, Appellants point to alleged evidence of "unexpected results" in the Specification. (App. Br. 18-19, 21, 29.)

Chen teaches that, for the claim 4 embodiment, the thickness of the first spin-on-glass layer 40 is "about 2000 to 4000 Angstroms." (FF 5.) Claim 4 does not specify a thickness of the second spin-on-glass layer 42. (FF 5.) However, Chen further teaches that "[t]he preferred thickness of [the second spin-on-glass] layer 42 is between about 4000 to 6000 Angstroms." (FF 6.) Thus, with the combined teachings of the thickness of the first spin-on-glass layer 40 in the claim 4 embodiment and the "preferred thickness of

[3] Appellants cite figures 2 and 4 from Dietrich Meyerhofer, *Characteristics of Resist Films Produced by Spinning*, 49(7) J. APPL. PHYS. 3993-3997 (1978), to illustrate that greater spin speeds (revolutions per minute) results in thinner film thicknesses (App. Br. 24); and Honeywell Electronic Materials ACCUGLASS T-11 Product Bulletin (2002), to illustrate that the cured film thickness of the T-11 ACCUGLASS decreases with increasing spin speed for the 111, 211 and 311 product series (App. Br. 25-26).

layer 42," Chen teaches or suggests that the second spin-on-glass layer 42 (i.e., the claimed "second leveling film") is thicker than the first spin-on-glass layer 40 (i.e., the claimed "first leveling film"). (FF 5-6.) Therefore, Chen teaches or suggests the limitation "wherein said second leveling film is thicker than said first leveling film," as recited in independent claims 1-10, 31, 33, 149, 161 and 173.

Appellants argue that because the second spin-on-glass layer 42 of Chen is dispensed at a higher spin speed, the first spin-on-glass layer 40 of Chen is thicker than the second spin-on-glass layer 42. (App. Br. 21-27, 30.) To support this position, Appellants cite Meyerhofer (App. Br. 24) and a Honeywell Electronic Materials ACCUGLASS T-11 Product Bulletin (App. Br. 25-26). In addition to the reasons discussed above, we also find these arguments unconvincing because of the differences in experimental conditions between these two references and Chen.

First, Appellants cite figures 2 and 4 of Meyerhofer to illustrate that greater spin speeds (revolutions per minute) results in thinner film thicknesses. (App. Br. 24.) Figure 2 of Meyerhofer illustrates the relationship between film thickness and spin speed based on a theoretical calculation; there is no discussion of the surface topography of the substrate. (Meyerhofer p. 3994.) The measured film thicknesses in figure 4 of Meyerhofer were performed on "[s]quare glass substrates" characterized as "adequately flat and horizontal." (Meyerhofer p. 3995, col. 1.) In contrast, the substrate 10 of Chen contains a patterned conducting layer 34 with a thickness of about 6000 to 9000 Angstroms. (FF 4.) The spacing between the patterned conducting layer 34 can vary from over a micrometer to less than 0.5 micrometer. (FF 4.) Chen teaches applying spin-on-glass coatings

at lower spin speeds (e.g., 600 to 800 rpm) for the purposes of filling both low and high aspect ratio recesses more evenly (FF 2), rather than achieving a thicker spin-on-glass coating. Furthermore, the experiments of Meyerhofer were performed using a positive photoresist dissolved in methyl cellosolve acetate. (Meyerhofer p. 3995, col. 1.) In contrast, the spin-on-glass coatings of Chen are composed of a silicon-oxide (Si-O) network polymer dissolved in an organic solvent or a siloxane base material. (FF 7.) Due to the differences in experimental conditions between Chen and Meyerhofer (i.e., different surface topography and different spin-on-glass materials), Appellants have not established that the general trend observed in Meyerhofer (i.e., greater spin speeds resulting in thinner film thicknesses) would accurately predict the thicknesses of the first spin-on-glass layer 40 and the second spin-on-glass layer 42 of Chen based *only* on spin speed. Furthermore, Chen does not teach that all parameters other than spin speed are identical for the application of the first spin-on-glass layer 40 and the second spin-on-glass layer 42. In other words, there may be parameters other than spin speed that differ for the application of the first spin-on-glass layer 40 and the second spin-on-glass layer 42.

Second, Appellants cite the Honeywell reference to support the argument that the disclosure in column 6, lines 6-9 of Chen (i.e., "For example, the series 211 [of ACCUGLASS] has a lower viscosity and produces a thinner coating of about 2000 Angstroms while series 314 and 311 have a higher viscosity and produce coatings of about 3000 Angstroms") does not teach the thickness of the first spin-on-glass layer 40. (App. Br. 25-26.) Instead, Appellants argue, this passage refers to the differences in viscosity between series 314 and 311. (App. Br. 25-26.) To

support this position, Appellants contend that the Honeywell reference illustrates similar thickness and spin speed data as column 6, lines 6-9 of Chen. (App. Br. 25-26.) Appellants further argue that because the Honeywell reference discloses slower spin speeds resulting in higher thicknesses, the first spin-on-glass layer 40 of Chen would be thicker than the second spin-on-glass layer 42. (App. Br. 26.)

Even if Appellants are correct that Chen's disclosure at column 6, lines 6-9 relates to viscosity, Chen teaches that the thickness of the first spin-on-glass layer 40 is "about 2000 to 4000 Angstroms" in the claim 4 embodiment (FF 5), as discussed above. Furthermore, although the Honeywell reference illustrates a general trend that a slower spin speed results in a higher thickness, this reference provides no disclosure of experimental conditions (i.e., surface topography of the substrate). Chen teaches applying spin-on-glass coatings at lower spin speeds (e.g., 600 to 800 rpm) for the purposes of filling both low and high aspect ratio recesses more evenly (FF 2), rather than achieving a thicker spin-on-glass coating. In contrast, the Honeywell reference provides no information regarding surface topography. Moreover, Appellants have not established that the chemical composition and properties of the ACCUGLASS remained consistent between the reduction to practice date of Chen (i.e., on or before June 13, 1994) and the publication date of the Honeywell reference (i.e., 2002). Due to the unknown experimental conditions in the Honeywell reference (i.e., surface topography and ACCUGLASS composition), Appellants have not established that the general trend observed in the Honeywell reference (i.e., a slower spin speed resulting in a higher thickness) would accurately predict the thicknesses of the first spin-on layer 40 and the second spin-on-glass

layer 42 of Chen based *only* on spin speed. Furthermore, as discussed previously, Chen does not teach that all parameters other than spin speed are identical for the application of the first spin-on-glass layer 40 and the second spin-on-glass layer 42.

Appellants also argue that dependent claims 3-6 of Chen illustrate that the first spin-on-glass layer 40 is thicker than the second spin-on-glass layer 42. (App. Br. 30.) In particular, Appellants argue that Chen's claim 4 recites a thickness of the first spin-on-glass layer 40 of 2000 to 4000 Angstroms; and claim 6 recites a thickness for the second spin-on-glass layer 40 of 2000 to 2500 Angstroms. (App. Br. 30.) Thus, Appellants argue, Chen teaches that the first spin-on-glass layer 40 is thicker than the second spin-on-glass layer 42. (App. Br. 30.)

Appellants' argument is not convincing because Chen's claim 4 embodiment is separate from the claim 6 embodiment, and there is no direct or indirect dependency between claims 4 and 6. Chen's claim 4 depends from claim 3, which depends from claim 1. Chen's claim 6 depends from claim 5, which depends from claim 1. Chen's claim 4 embodiment does not recite a thickness of the second spin-on-glass layer 42 (FF 5) and Chen's claim 6 embodiment does not recite a thickness of the first spin-on-glass layer 40 (FF 6). In other words, Chen does not teach a single embodiment in which both the thicknesses of the first spin-on-glass layer 40 and the second spin-on-glass layer 42 are explicitly defined.

The Examiner found that the first spin-on-glass layer 40 and the second spin-on-glass layer 42 have different thicknesses (Ans. 5-7) and forming the second spin-on-glass layer 42 thicker than the first spin-on-glass

layer 40 would be a matter of routine experimentation based on the surface topography of the substrate (Ans. 7).

Appellants argue that no reasoning has been provided for the Examiner's proposed modification of Chen. (App. Br. 27.) In particular, Appellants argue that there is no reason to modify Chen because this reference "[does] not appear to be relevant to a pixel electrode." (App. Br. 27.) We do not find this argument persuasive.

As discussed above, with the combined thickness of the first spin-on-glass layer 40 in the claim 4 embodiment of Chen and the "preferred thickness of layer 42," Chen teaches or suggests that the second spin-on-glass layer 42 is thicker than the first spin-on-glass layer 40 (FF 5-6). Because Chen teaches or suggests both the thickness of the first spin-on-glass layer 40 and the thickness of the second spin-on-glass layer 42, Appellants' arguments regarding a reason to modify Chen are not persuasive.

Moreover, in reference to Figure 3 (labeled "Prior Art") of the Specification, Appellants describe that "the pixel electrode 111 might be broken because of insufficient flatness of the levelling film" and "since the unevenness due to the level differences remains on the surface of the pixel electrode 111, poor orientation of the liquid crystal 123 is caused on the uneven region of the surface."[4] (FF 10.) Chen relates to "the formation of planarized insulating layers on semiconductor substrates having irregular surface features." (FF 1.) Chen teaches that "the improved planar dielectric layer is very important" and that the spin-on-glass process provides for "an

[4] Appellants have not challenged the paragraphs in the Specification cited by the Examiner as "admitted prior art" (Ans. 4).

improved planarized dielectric layer over substrates having irregular surface topography with micrometer and submicrometer feature sizes." (FF 1.) Furthermore, Chen teaches that non-planar surfaces can result in "unwanted distorted photoresist images" during optical exposure of the photoresist or "residue on the sidewalls of the underlying patterns which can lead to intra-level shorts" after anisotropic etching to pattern the various conducting layers. (FF 1.) Thus, we find that one of ordinary skill in the art would combine Chen with Applicants' "admitted prior art" for the benefit of "an improved planarized dielectric layer over substrates having irregular surface topography" (FF 1) to prevent breakage of the admitted prior art pixel electrode 111 and poor orientation of liquid crystal 123 (FF 10).

Appellants further dispute the Examiner's finding that the second spin-on glass layer 42 of Chen is thicker than the first spin-on-glass layer 40 because Chen teaches an additional air dry step during the application of the first spin-on-glass layer 40 which includes a substrate rotation for 15 seconds. (App. Br. 30.) In particular, Appellants argue that the Examiner's finding lacks support. (App. Br. 30.) However, Appellants' argument is not germane because, as discussed, Chen teaches or suggests both the thickness of the first spin-on-glass layer 40 and the thickness of the second spin-on-glass layer 42. (FF 5-6.)

Impermissible Hindsight

Appellants also argue that the rejection is based on improper hindsight by picking and choosing among isolated portions of Chen. (App. Br. 28-29.) We do not find this argument persuasive. As discussed above, with the teachings of the thickness of the first spin-on-glass layer 40 in the claim 4

embodiment of Chen and the “preferred thickness of layer 42,” Chen provides a teaching or suggestion that the second spin-on-glass layer 42 is thicker than the first spin-on-glass layer 40. (FF 5-6.) Because Chen teaches both the thicknesses of the first spin-on-glass layer 40 and the “preferred thickness” of second spin-on-glass layer 42, Appellants’ arguments regarding picking and choosing among isolated teachings of Chen are not convincing.

Evidence of Unexpected Results

Last, Appellants also point to alleged evidence of “unexpected results” in the Specification. (App. Br. 18-19, 21, 29.) In particular, Appellants argue that pages 3-7 and 17 of the Specification and figures 5 and 6 provide “a number of unique and unexpected results.” (App. Br. 21.)

However, the evidence offered by Appellants is deficient because the purported evidence is not commensurate in scope with the claims. In particular, independent claim 1 does not recite any dimensions (i.e., thickness or width) for “a wiring connecting to the semiconductor film” or any spacing intervals between the “wiring.” Likewise, Appellants’ claim 1 does not recite any thicknesses for “a first leveling film” or “a second leveling film.” While Appellants’ Specification describes experimental results for spin coating over a specific topography (FF 11-13), these dimensions are not recited in independent claim 1 and we decline to import them.

Rebuttal of a prima facie case of obviousness requires evidence of unexpected results commensurate in scope with the claimed subject matter. *See Dill*, 604 F.2d at 1361. Because Appellants’ claim 1 does not recite

limitations regarding the dimensions or spacing of the "wiring" and the thickness of the "first leveling film" or "second leveling film," Appellants' arguments are unpersuasive.

Tang was cited by the Examiner for teaching a TFT-EL device, including forming an EL cathode 84 over a surface of the device. (Ans. 9; FF 8.) Appellants have not presented any convincing argument or evidence that the Examiner erred in combining Tang with Applicants' "admitted prior art," Chen and Hanihara.

Hanihara was cited by the Examiner for teaching the formation of wiring layers 31, 32 and 33 composed of layers of titanium and aluminum for a liquid crystal display (LCD) device. (Ans. 9-10; FF 9.) Appellants have not presented any convincing argument or evidence that the Examiner erred in combining Hanihara with Applicants' "admitted prior art," Chen and Tang.

Therefore, Appellants have not shown that the Examiner erred in finding that the combination of Applicants' "admitted prior art," Chen, Tang and Hanihara teaches or suggests the limitation "wherein said second leveling film is thicker than said first leveling film," as recited in independent claim 1.

We conclude that Appellants have not shown that the Examiner erred in rejecting independent claim 1 under 35 U.S.C. § 103(a). Claims 2-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205 were not argued separately and fall with claim 1.

CONCLUSION

Based on the findings of facts and analysis above, we conclude that Appellants have not shown that the Examiner erred in rejecting claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205 under 35 U.S.C. § 103(a).

DECISION

The rejection of claims 1-10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35-41, 43-50, 52-59, 61-68, 70-77, 79-86, 88-91, 93-95, 97-101, 103-105, 107-111, 113-115, 117-121, 123-125, 127, 129-131, 133-135, 137, 139-141, 143-145, 147, 149-152, 154-156, 158, 161-164, 166-168, 170, 173-176, 178-180, 182 and 185-205 under 35 U.S.C. § 103(a) is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

sss

COOK, ALEX, MCFARRON, MANZO,
CUMMINGS & MEHLER, LTD.
SUITE 2850
200 WEST ADAMS STREET
CHICAGO, IL 60606